Title: Requirements Analysis to offer Courses through Mobile Devices

Theme: Formal Education
Sub Theme: Technologies for Scaling up ODL programmes

Authors: 1. Mr.P.Venkata Suresh, Assistant Professor, School of Computer and Information Sciences(SOCIS), Indira Gandhi National Open University, New Delhi (e-mail: pvsuresh@ignou.ac.in, Mobile: +919810409145)

2. Ms.G.Mythili, Analyst, Staff Training and Research In Distance Education(STRIDE), Indira Gandhi National Open University, New Delhi (e-mail: gmythili@ignou.ac.in, Mobile: +919868287636)

3. Prof.K.R.Srivathsan, Pro Vice-Chancellor, Indira Gandhi National Open University, New Delhi (e-mail: srivathsan@ignou.ac.in, Mobile: +919968664425)

ABSTRACT

The subscribers to mobile services are growing rapidly across the World which cannot be ignored in teaching/learning and other associated processes. The aim of the paper is to perform requirements analysis to develop software for offering the Certificate in Information Technology (CIT) programme of IGNOU through m-learning mode that is currently being delivered through open and distance learning (ODL) mode. Requirements analysis includes analysis of physical environment, interfaces, user and human factors, functionality, documentation, data, resources and other related issues.
The paper may work as a primer for any Open University or Distance Education institution for the offering of courses through mobile devices.

Index terms: Mobile devices, Technology, Course, Memory, Internet, Video

INTRODUCTION

This paper performs requirements analysis to offer CIT in m-learning mode. Requirements analysis is the first phase of any software development life cycle. To offer CIT in m-learning mode, it is essential to develop software that offers appropriate interfaces to students, teachers and guests. Also, the software needs to include various elements that enable inclusion of course material, delivery of lectures, conduct of online tests, and display of scores secured by students online. The significance of the requirements analysis is that , being the first phase, any errors that creep into the system at this stage will show a negative impact on the performance of the system. Hence, it is essential that all stake holders are met and requirements are chalked out through various means such as interviews, fill-in-forms , and survey of documents etc. Some of the factors that were listed by [1] were considered to perform requirements analysis.

ABOUT CIT

CIT is a Certificate Programme in Information Technology of six months duration. It is of 18 credits. It consists of a total of 4 courses, namely, CIT-001 (Fundamentals of Computer Systems), CIT-002 (Introduction to Information Technology) , CIT-003 (Web based Technologies and Multimedia Applications) and CITL-001 (Laboratory Course). The first three courses are completely theory based and the last course is completely practical oriented. There were a total of 38 theory counseling sessions and 54 practical counseling sessions. Each session is of 1 hour duration.

REQUIREMENTS ANALYSIS TO OFFER CIT THROUGH M-LEARNING MODE

The following are various factors that form part of requirements analysis to offer CIT through m-learning mode:

Physical environment

In this section, we address the issues that are related to physical environment. It includes the location(s) of the equipment to function, existence of any environmental restrictions such as temperature etc.

Since it is the software that will be used to offer CIT through mobile devices, and the software may be accessed by significant number of mobile devices across the World, the software will be resident in Server. There are at least two options related to the location of the Server. The location can be in University department which will be offering the course through mobile device or any where across the Country or abroad. In fact, the most important issue is ensure service in an uninterrupted manner. To ensure uninterrupted service, there is need for backup servers which may or may not be co-located with the main server. So, it is herewith proposed to have a server with one back up server for the software that will be used by mobile devices across the World to access the content of CIT through mobile devices.

The environmental conditions in India don't create any known hazards for the hardware equipment. However, a well informed decision will be taken in case of need to utilize servers abroad.

Interfaces

In this section , we address the issues such as the number of lines through whom input is taken, number of lines to whom output is going, any issues related to format of the data that needs to be input or output, and any issues related to the medium in which the data should be present.

As the software that will used to access CIT will be residing in server and will be accessed by mobile devices across the World, the configuration of the server should enable access to atleast the number of connections that are equivalent to the number of students enrolled to the programme. Hence, since the software is server resident, the software will receive inputs from significant number of connections. The data provided as input from these connections may vary as follows:

- There may be request to access the content from a specific point from some connections
- There may be request to access the content from the starting lesson in the case of some connections

So, basically, there will be input connections of two different types as mentioned above.

The software will output the m-learning content of CIT to various mobile devices which initiated access. So, the number of output connections will be multiple in number. The output connections will be mainly of three types. Two of them will be responses to the above mentioned two types of input connections. The third may be an error message which cannot honor the request of either of the above mentioned input connections.

The entire m-learning content of CIT will use WML (Wireless Markup Language) and compliant technologies so that it can be rendered on maximum number of models of mobile devices. As the software is not a data processing application, the issue of its presence in a specific medium does not exist.

Users and Human factors

This section will document the users of the CIT m-learning system , types of users, skill levels of different types of users, training requirements, ease of use of the system, and scope of the misuse of the system.

All CIT students will be users of CIT m-learning system. The maximum number of students who use it will be appr. 3000 students. The users will be students which include youngsters who successfully cleared their 10^{th} standard examinations, and house wives primarily. The skill levels may vary across students as they pass from different state boards. Some of them may have IT skills and others may not have. However, they need to be comfortably in pursuing CIT from their respective mobile devices. To facilitate, a demo of the usage of the system may be posted to the website. This will enable students who face difficulty in using CIT m-learning system to run the demo before actually starting using the CIT m-learning system. CIT m-learning system will have a mobile interface that will be user guided and menu based. The scope of unauthorized use is more than misuse of the system as students may share their account details with others who may use the system. However, as it is an academic system, the scope of misuse is minimal.

Functionality

This section will address the issues focusing on functionality, its timing, what will be done, different modes of operation, frequency of the update of the system, constraints on execution speed, response time, or throughput.

CIT m-learning system will facilitate teaching-learning process to students. It will enable teachers to deliver lectures LIVE, interact with students using different m-learning tools including 3G based video conferencing. The students will be able to access course materials, run the simulations as well as submit assignments using their mobile devices. There will be only single mode of operation. The interface will be accessible only to students. The system will be updated every six months. There are constraints regarding execution speed, response time and throughput. However, these constraints are due to network. So, it depends on the network to which the student's mobile device is connected to have comfortable execution speeds, response times and throughputs.

Documentation

This section addresses the issues such as quantum of documentation needed, format of it, and types of documentation needed.

Documentation is required which includes description about the usage of different components of the system. The documentation will be online as well as in book format. There will only one type of documentation which will cater to all types of students.

Data

This section will address the issues related to data. CIT m-learning system doesn't require any significant amount of input data. It kicks off on the basis of student's enrollment number and password. It creates log files that include information about the content that was accessed by the student, his/her scores in the online tests etc. These log files can be partially accessed by the student himself, but all the log files can be accessed by the corresponding resource person. The relevant data is stored in a back end RDBMS (Relational Database Management System).

Resources

This section addresses the issues related to the resources needed to develop m-learning system for CIT, developer skills needed, memory requirements, timelines for development , and budgetary requirements.

There are no specific hardware requirements as the software is expected to run on the mobile devices. The software proposed to be used is J2ME (Java 2 Micro Edition) as front end and Oracle as back end. Hence, the developers are expected to possess skills in J2ME especially. Memory requirements are not significant when compared to the vast advancements that have taken place in the corresponding technologies. The total development effort may take approximately 30 person-month. There are no issues with budgetary requirements as , on average 1000 students take admission to CIT per cycle who pay approximately US $ 100 each which works out to be approximately US $ 100000. The fee has been mentioned in US $ for the sake of convenience as , in reality, fee is collected in Indian Rupees. It will be ensured that the cost on the project does not exceed the income keeping in view of the other overheads. There are no specific limits on the expenditure that can be incurred on hardware and software costs.

Other issues

CIT m-learning system will be secure in terms of accessibility. Back up of the log files particularly shall be taken on weekly basis. The log files shall be stored at a different location. All necessary precautions shall be taken so that the server and other hardware are immune from possible damages such as fire, water, and theft etc. The development effort will follow appropriate quality standards to ensure that the CIT m-learning system will be robust, runs across various mobile operating systems, and renders similarly across all the mobile devices.

LIMITATIONS

The major limitation is that the paper focuses only on the first phase of the Software development life cycle i.e., requirements analysis. Ultimately, for the software to be built, the work needs to be done across the remaining phases , namely, Design, Coding, Testing, and Maintenance. Another limitation is that the paper carried out requirements analysis factor-wise. A Software Requirements Specification document as output of the requirements analysis will be appropriate to move to the next phase of the Software development life cycle.

CONCLUSIONS & FUTURE WORK

The conclusion is that it is possible to offer CIT in m-learning mode. The software that enables CIT to be offered in m-learning mode should be robust and should offer an easy interface to all the stake holders. The future work can focus on the remaining phases of the Software development life cycle to offer CIT in m-learning mode.

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